

Claims

1. A three-dimensional wire-woven cellular light structure
5 formed of six groups of orientational-continuous-wires intercrossed
with each other at 60 degrees or 120 degrees of angles in a
three-dimensional space, a unit cell of the cellular light structure
comprising:

a) a first regular tetrahedron member formed of a first to sixth
10 wires, the first regular tetrahedron member being constructed in such
a manner that the first wire 4, the second wire 5, and the third wire
6 are intercrossed in a plane to form an equilateral triangle, the fourth
wire 7 is intercrossed with the intersection point of the second wire
5 and the third wire 6, the fifth wire 8 is intercrossed with the
15 intersection point of the first wire 4 and the second wire 5, and the
sixth wire 9 is intercrossed with the intersection point of the third
wire 6 and the first wire 4, the fourth wire 7, the fifth wire 8, and
the sixth wire 9 being intercrossed with one another at a single
reference intersection point; and

20 b) a second regular tetrahedron member contacted with the first
regular tetrahedron member at the reference intersection point and
having a similar shape to the first regular tetrahedron member, the
second regular tetrahedron member being constructed in such a manner
that the fourth wire 7, the fifth wire 8, and the sixth wire 9 pass
25 the reference intersection point and extend further, each of a group
of wires 4', 5', and 6' is intercrossed with two wires selected from

the extended fourth, fifth and sixth wires, the group of wires 4', 5' and 6' being in parallel with the first wire 4, the second wire 5, and the third wire 6 respectively;

c) wherein the wires are intercrossed with each other at 60
5 degrees or 120 degrees, and the unit cell is repeated in a three-dimensional pattern, thereby forming a truss-type structure.

2. A cellular light structure according to claim 1, wherein,
among the six groups of orientational-wires, three groups of
10 orientational-wires forming a vertex of the first or second regular tetrahedron member are intercrossed clockwise or counterclockwise when seen from the front of the vertex.

3. A cellular light structure according to claim 1, wherein the
15 first and second regular tetrahedron members have a similarity ratio of 1:1.

4. A cellular light structure according to claim 1, wherein the
first and second regular tetrahedron members have a ratio of similarity
20 in the range of 1:1 to 1:10.

5. A cellular light structure according to claim 1, wherein the
wires are any one selected from the group consisting of metal, ceramics,
synthetic resin, and fiber-reinforced synthetic resin.

25 6. A cellular light structure according to claim 1, wherein the intersection point of the wires is bonded by any one selected from the group consisting of a liquid- or spray-form adhesive, brazing,

soldering, and welding.

7. A reinforced composite material manufactured by filling with a resin, a ceramic or a metal the empty space of the three-dimensional wire-woven cellular light structure according to any one of claims 1 to 6.

8. A reinforced composite material manufactured by filling with a resin, a ceramic or a metal the empty space of a smaller regular tetrahedron member among the first and second regular tetrahedron members, which constitutes a unit cell of the three-dimensional wire-woven cellular light structure according to claim 4.

9. A method of fabricating a three-dimensional wire-woven cellular light structure formed of six groups of orientational-continuous-wires intercrossed with each other at 60 degrees or 120 degrees of angles in a three-dimensional space, the method comprising steps of:

a) forming an equilateral triangle by intercrossing a first wire 4, a second wire 5, and a third wire 6 in a plane;

b) forming a first regular tetrahedron member by intercrossing a fourth wire 7 with the second wire 5 and the third wire 6, intercrossing a fifth wire 8 with the first wire 4 and the second wire 5, intercrossing a sixth wire 9 with the third wire 6 and the first wire 4, and intercrossing the fourth wire 7, the fifth wire 8, and the sixth wire 9 through a single reference intersection point;

c) forming a second regular tetrahedron member contacted with

the first regular tetrahedron member at the reference intersection point and having a similar shape to the first regular tetrahedron member by passing and extending the fourth wire 7, the fifth wire 8, and the sixth wire 9 through the reference intersection point, and
5 intercrossing each of a group of wires 4', 5', and 6' with two wires selected from the extended fourth, fifth and sixth wires, the group of wires 4', 5' and 6' being in parallel with the first wire 4, the second wire 5, and the third wire 6 respectively; and

 d) repeatedly forming the first and second regular tetrahedron
10 member to thereby form a truss-type structure.

10. A method according to claim 9, wherein, among the six groups of orientational-wires, three groups of orientational-wire forming a vertex of the first or second regular tetrahedron member are
15 intercrossed clockwise or counterclockwise when seen from the front of the vertex.

11. A method according to claim 9, wherein the first and second regular tetrahedron members have a similarity ratio of 1:1.

20

12. A method according to claim 9, wherein the first and second regular tetrahedron members have a ratio of similarity in the range of 1:1 to 1:10.

25

13. A method according to claim 9, wherein the wires are any one selected from the group consisting of metal, ceramics, synthetic resin, and fiber-reinforced synthetic resin.

14. A method according to claim 9, further comprising a step
of bonding the intersection point of the wires, wherein the
intersection points of the wires are bonded by any one selected from
the group consisting of a liquid- or spray-form adhesive, brazing,
5 soldering, and welding.

15. A method of manufacturing a reinforced composite material
by filling with a resin, a ceramic or a metal the empty space of a
three-dimensional wire-woven cellular light structure manufactured
10 according to any one of claims 9 to 14.

16. A method of manufacturing a reinforced composite material
by filling with a resin, a ceramic or a metal the empty space of a smaller
regular tetrahedron member among the first and second regular
15 tetrahedron members, which constitutes a unit cell of a
three-dimensional wire-woven cellular light structure manufactured
according to claim 12.

20

25